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# Performance Improvement of Medical Images Using Wavelet Transformation

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**ABSTRACT:** The picture reconstruction using DCT (Discrete Cosine Transform) and wavelet transform is detailed in this article. The photographs were obtained from a PET scanner, which was used in the reconstruction process. These two iterative reconstruction approaches were helpful in exposing the noise and blur in a PET photograph. The reconstruction was carried out using MATLAB tools. A PET picture was examined and noise was extracted using the DCT process. The provided image was analysed in various ways using the wavelet technique, such as horizontal and vertical shapes, and so on. The image's edge was observed here, and the noise was then suppressed. The results of both approaches were plotted as a PSNR (peak signal to noise ratio) vs. sampling time graph (no of iterations).

**KEYWORDS:-** Reconstruction, Medical Images, PSNR, Wavelet

## I. INTRODUCTION

Atherosclerosis, a disorder in which fatty substance deposits along the walls of arteries, is one form of cardiovascular disease. This fatty substance thickens, hardens (forming calcium deposits), and gradually blocks and narrows the arteries, limiting blood supply into the veins and arteries. The narrowed arteries are referred to as lesions. The lesions are manually viewed and diagnosed using the clinical process. As a result, there is a risk of misinterpretation or misdiagnosis. A method known as picture segmentation may be used to see narrowed arteries in order to solve this issue. The method of partitioning a digital image into several segments is known as image segmentation. X-ray Angiographic scans are used in the analysis, and image segmentation is used to detect lesions in the direction of blood flow using Lab VIEW tools [1]-[5].

Images will now be collected across a wide range of spectral regions throughout the electromagnetic spectrum. PET is a form of nuclear imaging that can be used to detect pathogens and tumours. A positron emitting radionuclide (tracer) is injected into the human body, and the device senses a pair of gamma rays released indirectly from it. A biologically active molecule inside the body can create a 3-D model, which will be created using machine analysis. FDG (fludeoxyglucose), a glucose and fluorine-18 analogue, is the most widely used radiotracer in PET scanners. The information gathered by the scanner is a compilation of coincidences that can be arranged into projection photos known as sinograms. For the reconstruction phase, this estimated data is used. Picture restoration is the process of revealing the underlying images that have been obscured by blur and noise. This is essential since no imaging instrument can be built without noise or corruption [6]-[10].

The aim is to use mathematical and computational models to recover image knowledge that has been lost during the image creation phase, as well as to recover a degraded image. Every algorithm begins with an expected image, computes projections from it, compares the original projection results, and updates the image based on the discrepancy between the calculated and real projections. Iterative restoration is a mechanism that allows for a lot of flexibility. Iterative reconstruction techniques are superior to the traditional filtered back projection (FBP) process, but they are more computationally expensive. The Maximum Likelihood technique, a traditional statistical assessment

process, is the most basic concept for iterative reconstruction. The picture will be reconstructed in several steps using this iterative process, with the result being a plot of PSNR (peak signal noise ratio) versus sampling time (no of iterations). As a result, the performance would be superior to a standard reconstruction. In the case of incomplete data, the iterative method can reconstruct an image. PSNR stands for the ratio of a signal's maximal potential power to the strength of corrupting noise, which affects the accuracy of its representation as a picture [11]-[15].

## II. PROPOSED METHOD

The provided picture is compressed first using the DCT process, which uses the RGB2gray feature to transform RGB images to grayscale by removing the hue and saturation details while keeping the luminance. The output of this gray-edged picture is plotted with noise and disruption. DCT can be used to remove the disturbance. The discrete cosine transform (DCT) is a separable linear transformation, which means that the two-dimensional transform is analogous to a one-dimensional DCT in one dimension preceded by a one-dimensional DCT in the other. Noise is eliminated and the output is set to zero when DCT is added to the file. This subplot shows the relationship between sampling period and PSNR.

In the world of computer vision, edge detection is a critical component. Edges help with segmentation and object recognition by defining the boundaries between regions in a picture. They may be used to display where shadows are in a picture or some other significant difference in the image's intensity. Low-level image processing relies on edge detection, and good edges are needed for higher-level processing. The issue is that edge detectors in general perform poorly. Though their behaviour can fall within acceptable limits in some circumstances, edge detectors have a hard time adjusting to new scenarios in general. Lighting situations, the appearance of artefacts of similar intensities, the density of edges in the image, and noise all affect the efficiency of edge detection. Although both of these issues can be addressed by modifying those values in the edge detector and changing the threshold value for what is called an edge, no good mechanism for automatically setting these values has been identified, so they must be adjusted manually by an operator each time the detector is run with new data. Since different edge detectors perform best under different circumstances, it will be optimal to provide an algorithm that employs several edge detectors, implementing each one when the scene conditions are most conducive to its detection process. To build this machine, you must first figure out which edge detectors work well in which situations. This information could then be used to build a multi-edge-detector device that analyses the scene and selects the best edge detector for the current collection of details.

We considered two separate implementations for one of the edge detectors: one that used only strength and the other that used colour detail. We also considered one additional edge detector which takes a different philosophy to edge detection. It will be more effective to simply adapt the process of photography to one that is more suitable to edge detection rather than attempting to locate the right edge detector to add to standard images. It employs a sensor that shoots a series of photographs in quick succession under various lighting conditions. Since the hardware for this kind of edge detection differs from that used for the other edge detectors, it will not be used in the multiple edge detector scheme, although it may be a suitable alternative.

We used Lab VIEW to simulate the viability and performance of our proposed tool using the real-time DSA photos we obtained.

The ECG signals are sampled at the same time as the X-ray imaging. The data was saved in the Digital Imaging and Communications in Medicine (DICOM) Format, which is a medical standard for transferring photographs, movies, and other diagnostic data across most modalities. To evaluate the extracted data, we created an algorithm using LabVIEW from National Instruments. The details was collected from each DICOM patient data file and stored as a jpeg file. Using Lab VIEW, we built an algorithm that extracts every frame from the cine sequence and processes them for tissue analysis.

## III. SIMULATION RESULTS

Labview is used to run the simulation. The initial representation of the coronary artery and the hippocampus as seen in Figure 1. Different edge detection operators were added to the provided original picture, and the effect was seen in Figures 2 to 5. After adding the wavelet, Figure 6 displays the initial picture without noise. The initial picture wavelet transition as seen in Figure 7.

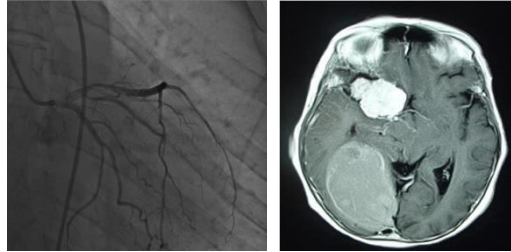


Fig 1. Original image of coronary heart image and brain image

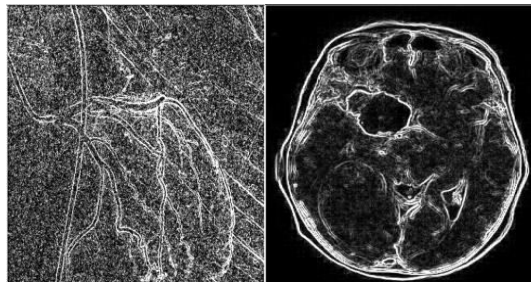


Fig 2. Roberts Operator

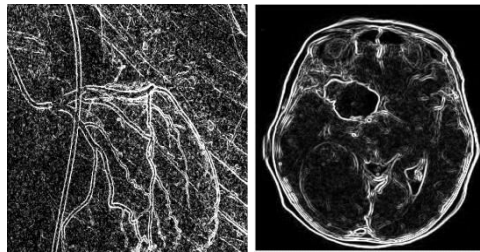


Fig 3 Sobel Operator

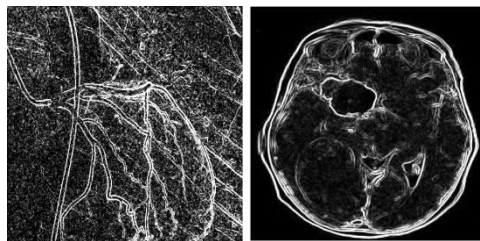


Fig.4. Prewitt Operator

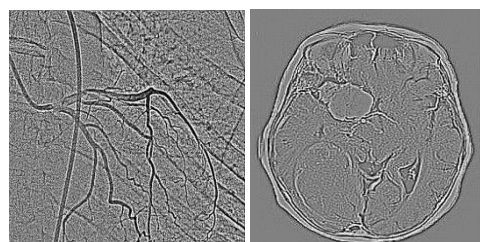


Fig 5. Laplacian Operator

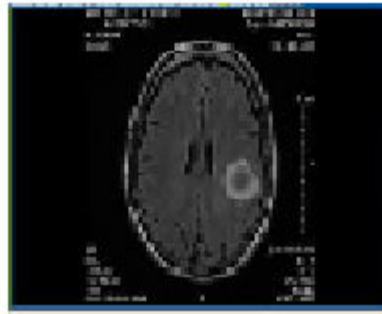


Fig.6. Image without Noise after Applying Wavelet

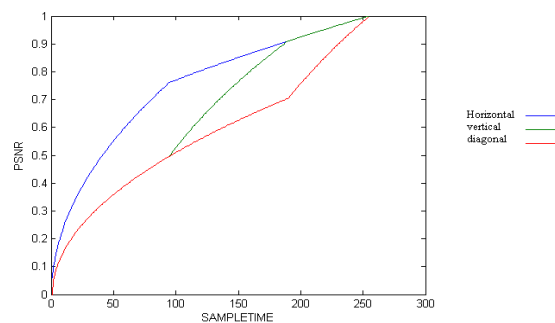


Fig.7. Output of Wavelet Transform

#### IV. CONCLUSION

The performance of reconstructing the PET image using the DCT method and wavelet transform was a plot between PSNR and sample time. By the sampling time, the amount of noise in the picture was minimized. Images are analysed using a variety of operators. Only X-ray pictures are considered to be useful for Sobel operators. Only MRI scan images are ideal for Roberts operators. Both X-ray and MRI scan images are useful for Prewitt operators.

#### REFERENCES

1. Hong ZHENG, Dequen ZHENG Yanxianag HU, Sheng Li. Study on the Optimal Parameters of Image Fusion Based on Wavelet Transform[J]. Journal of Computational Information Systems (2010) 131-137.
2. Smt. G. Mamatha, L. Gayatri, "An Image Fusion Using Wavelet And Curvelet Transforms", Global Journal of Advanced Engineering Technologies, Vol11, Issue-2, 2012, ISSN: 2277-6370.
3. R. K. Sharma, "Probabilistic Model-based Multisensor Image Fusion", PhD thesis, Oregon Graduate Institute of Science and Technology, Portland, Oregon, 1999.
4. S. Li, J. T. Kwok, and Y. Wang, "Combination of images with diverse focuses using the spatial frequency," Information Fusion 2, pp. 169–176, 2001.
5. S. Kor and U. Tiwary, "Feature level fusion of multimodal medical images in lifting wavelet transform domain" IEEE International Conference of the Engineering in Medicine and Biology Security, pp. 1479–1482, 2004.
6. A. H. Gunatilaka and B. A. Baertlein, "Feature-level and decision-level fusion of non coincidentally sampled sensors for land mine detection" IEEE Transactions on Pattern Analysis and Machine Intelligence 23(6), pp. 577–589, 2001.
7. Daljit Kaur, P S Mann "Medical Image Fusion Using Gaussian Filter, Wavelet Transform and Curvelet Transform Filtering" International Journal of Engineering Science & Advanced Technology
- [8. Chen, G. and T. Bui (2003). "Multiwavelets denoising using neigh-boring coefficients." Signal Processing Letters, IEEE 10(7): 211-214.
9. Chen, G., T. Bui, et al. (2010). "Denoising of three dimensional data cube using bivariate wavelet shrinking." Image Analysis and Recognition: 45-51.



10. Cohen, A., I. Daubechies, et al. (1993). "Wavelets on the interval and fast wavelet transforms." Applied and Computational Harmonic Analysis 1(1): 54-81.
11. Daubechies, I. (1990). "The wavelet transform, time-frequency localization and signal analysis." Information Theory, IEEE Trans-actions on 36(5): 961-1005
12. Do, M. and M. Vetterli (2002). Texture similarity measurement using Kullback-Leibler distance on wavelet subbands, IEEE
13. Donoho, D. L. (1995). "Denoising by soft-thresholding." IEEE Trans. Inform. Theory 41(3): 613-627.
14. Donoho, D. L. and I. M. Johnstone (1994). "Ideal spatial adaptation via wavelet shrinkage." Biometrika 81(3): 425-455.
15. Jing Tian , Li Chen Image despeckling using a non-parametric statis-tical model of wavelet coefficients Biomedical signal processing and control 6 (2011) 432-437



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